

Appl. No. 09/633,760  
Amtd. dated November 17, 2003  
Reply to Office action dated August 15, 2003

Attorney ref: US000180 (236/144)

**Listing of Claims:**

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21
1. (Currently Amended) A method of determining a position of an unknown point in space using at least two cameras aimed ~~such as~~ to have an a substantially overlapping field of view, comprising the steps of,
- generating in each of said cameras an image corresponding to at least four points lying in a reference plane, the reference plane being common to the respective images of the cameras;
- calculating a planar projective transform that maps said images of said at least four points to a reference frame, said reference frame being a projection of said reference plane;
- generating, in each of said cameras, images of at least two calibration markers whose positions relative to said reference plane are known and an image of an unknown point;
- for each of said images of said at least two calibration markers and said image of an unknown point, applying said transform to define respective points in a plane of said image plane; and
- computing at least a distance of said unknown point from said reference plane responsively to at least a depth of said unknown point and coordinates of said unknown point and said at least two points transformed into said reference frame.
2. (Original) A method as in claim 1, wherein said step of computing includes computing a distance of said unknown point from said reference plane responsively to positions of said calibration points.
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Appl. No. 09/633,760  
Amdt. dated November 17, 2003  
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3. (Original) A method as in claim 2, wherein said positions indicate a distance of said calibration points from said reference plane.
4. (Original) A method as in claim 1, wherein said step of generating includes positioning said calibration markers in said overlapping field of view.
5. (Original) A method as in claim 4, wherein said step of positioning includes extending a boom with said markers.
6. (Original) A method as in claim 1, wherein said position includes only a distance from said reference plane.
7. (Currently Amended) A strap-down three-dimensional reconstruction system, comprising:
- a jig supporting at least two cameras;
  - said jig having a structure to support at least two calibration markers in a position such as to be substantially visible by said at least two cameras; and
  - said jig also supporting at least four reference markers in a visual field of each of said at least two cameras, all of said reference markers lying in a common plane; wherein said at least two cameras are used to determine a position of an unknown point in space according to the method of claim 1.
8. (Original) A system as in claim 7, wherein said four reference markers are corners of an aperture in a screen of said jig.
9. (Original) A system as in claim 7, wherein said four reference markers are projected onto a screen.
10. (Original) A system as in claim 7, further comprising an image processing computer connected to receive said images from said cameras and programmed to

Appl. No. 09/633,760  
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calculate a position of a point visible in each of said cameras responsively to position data corresponding to said calibration markers.

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11. (Currently Amended) A method of determining a position of an unknown point in space using at least two cameras aimed ~~such as~~ to have an a substantially overlapping field of view, comprising the steps of,

generating in each of said cameras an image corresponding to at least four points lying in a reference plane, the reference plane being common to the respective images of the cameras;

71  
calculating a planar projective transform that maps said images of said at least four points to a reference frame, said reference frame being a projection of said reference plane;

generating, in each of said cameras, images of at least two calibration markers whose positions relative to said reference plane are known;

transforming, by said planar projective transform, each of said images of calibration markers;

computing optical centers responsively to a result of said step of ~~step of~~ transforming;

generating in each of said cameras an image of an unknown point and calculating a position of said unknown point responsively to a result of said step of computing.

12. (Original) A method as in claim 11, wherein said step of calculating includes transforming said images of said unknown point using said planar projective transform.

Appl. No. 09/533,760  
Amdt. dated November 17, 2003  
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13. (New) A strap-down three-dimensional reconstruction system, comprising:  
a jig supporting at least two cameras;  
said jig having a structure to support at least two calibration markers in a position  
to be visible by said at least two cameras; and  
said jig also supporting at least four reference markers in a visual field of each of  
said at least two cameras, all of said reference markers lying in a common plane  
wherein said at least two cameras are used to determine a position of an  
unknown point in space according to the method of claim 11.
14. (New) A system as in claim 13, wherein said four reference markers are  
corners of an aperture in a screen of said jig.
15. (New) A system as in claim 13, wherein said four reference markers are  
projected onto a screen.
16. (New) A system as in claim 13, further comprising an image processing  
computer connected to receive said images from said cameras and programmed to  
calculate a position of a point visible in each of said cameras responsively to position  
data corresponding to said calibration markers.